WHAT IS CLAIMED IS:

1) An airborne time domain electromagnetic surveying system comprising:
   a) A tow assembly for connection to an aircraft, the tow assembly including:
      i) A flexible support frame including:
         (1) A transmitter section including a transmitter means; and
         (2) A receiver section including a sensor means;
   b) A transmitter driver linked to the transmitter section in a spaced apart relationship from the transmitter section, such spaced apart relationship being operable to reduce noise, wherein the transmitter driver and transmitter section in cooperation enable the system to generate an earthbound electromagnetic field pulse effective for geological surveying; and
   c) A non-linear gain amplifier linked to the sensor means that enables non-bucking high linear gain amplification of the earth response to the electromagnetic field pulse.

2) The airborne time domain electromagnetic surveying system claimed in claim 1, wherein the receiver section is substantially aligned with the central axis of the transmitter section.

3) An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the transmitter driver and the non-linear gain amplifier are connected to a computer including a control program for controlling the functions of the system of the present invention, wherein the computer is adapted to activate the pulse to define an "ON" interval, and to measure the earth response by operation of the sensor means in an "OFF" interval so as to generate selected survey data, which survey data is stored to a memory linked to the computer.

4) An airborne time domain electromagnetic surveying system as claimed in claim 3, wherein the transmitter section includes a sensor for measuring signal during the "ON" interval, and the computer is adapted to generate selected survey data from the "ON" interval signal measurements.

5) An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the transmitter section includes a generally flexible transmitter support frame, which transmitter support frame supports a transmitter coil.

6) An airborne time domain electromagnetic surveying system as claimed in claim 5, wherein the transmitter section consists of a plurality of interconnectable transmitter section frame members, such that the transmitter section can be assembled and disassembled.

7) An airborne time domain electromagnetic surveying system as claimed in claim 6, wherein the plurality of interconnectable transmitter section frame members enable the surface area of the transmitter section to be altered for different applications of the system.

8) An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the structure of the support frame enables a relatively large effective surface area with reduced drag during flight.

9) An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the tow assembly is connected to the aircraft by means of at least one cable means connected to the transmitter section at a plurality of points.

10) An airborne time domain electromagnetic surveying system as claimed in claim 9, wherein the tow assembly is connected to the aircraft by means of

a central cable at a first end connected to the aircraft, the central cable also including a second end opposite to the first end, and wherein a plurality of connecting cables are connected between the second end of the central cable and a plurality of points generally evenly distributed along the circumference of the transmitter section.

11)An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the receiver section includes a receiver support frame disposed generally along the central axis of the transmitter section.

12)An airborne time domain electromagnetic surveying system as claimed in claim 11, wherein the receiver support frame is connected to the transmitter support frame by means of a plurality of connecting cables.

13)An airborne time domain electromagnetic surveying system as claimed in claim 12, wherein the connecting cables are generally evenly distributed along the circumference of each of the receiver support frame and the transmitter support frame.

14)An airborne time domain electromagnetic surveying system as claimed in claim 11, wherein the receiver section includes a sensor coil flexibly connected to the receiver support frame for vibration reduction.

15)An airborne time domain electromagnetic surveying system as claimed in claim 14, wherein the sensor coil is elastically suspended inside the receiver support frame.

16)An airborne time domain electromagnetic surveying system as claimed in claim 11, wherein the receiver support frame consists of a plurality of interconnectable receiver section frame members.

17)An airborne time domain electromagnetic surveying system as claimed in claim 16, wherein the interconnectable receiver section frame members of the receiver support frame can be assembled and disassembled.

18)An airborne time domain electromagnetic surveying system as claimed in claim 6, wherein the transmitter section frame members define a polygonal profile.

19)An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the transmitter driver is located in the aircraft and is connected by a transmission cable to the transmitter section.

20)An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the support frame further includes a stabilizer for stabilizing the movement of the tow assembly during flight.

21)An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the aircraft is a helicopter.

22)An airborne time domain electromagnetic surveying system as claimed in claim 1, wherein the system further comprises a current measuring unit that measures the residual currents circulating in the transmission means during the "OFF" interval thereby enabling the system to minimize distortions caused thereby to the earth response to the electromagnetic field pulse.

23)A method of producing survey data comprising the steps of:

a) flying an aircraft with a lightweight survey tow assembly connected thereto, the tow assembly including:

i) A flexible support frame including:

(1) A transmitter section in including a transmission means; and

(2) A receiver section including a sensor means;

ii) A transmitter driver linked to the transmitter means in a spaced apart relationship from the transmitter section, such spaced apart relationship being operable to reduce noise, wherein the transmitter driver and transmitter means in cooperation enable the system to generate an earthbound electromagnetic field pulse effective for geological surveying; and

iii) A non-linear gain amplifier linked to the sensor means that enables non-bucking high linear gain amplification of the earth response to the electromagnetic field pulse;

Wherein the receiver section is substantially aligned with the central axis of the transmitter section.

b) Generating an earthbound electromagnetic field pulse effective for airborne geological surveying in an "ON" interval;

c) Sensing the earth response to the electromagnetic field response in an "OFF" interval;

d) Amplifying the earth response by means of a non-linear gain amplifier; and

e) Obtaining geophysical survey data from the amplified electromagnetic field response.

24) The method claimed in claim 21, further comprising the step of collecting in-phase information in the "ON" interval by means of a receiver means linked to the transmitter section.

25) The method claimed in claim 21, further comprising the step of adjusting the surface area of the transmitter section for specific survey applications.

26) The method claimed in claim 21, further comprising the step of adding additional receiver coils for multi-dimensional surveying.

27)The method as claimed in claim 21, comprising the further step of increasing the number of loop turns to suit the particular geophysical targets.

28)The method of claim 21, comprising the further step of measuring the residual currents circulating in the transmission means during the "OFF" interval by means of a current measuring unit, and thereby enabling distortions caused thereby to the earth response to the electromagnetic field pulse to be minimized.

29)A computer program for use on a computer for controlling a non-bucking airborne survey system, the computer being connected to a transmitter driver linked to a transmitter means, a receiver and a non-linear gain preamplifier, the computer program comprising:

a) A computer readable medium;

b) Computer instructions accessible to the computer readable medium for:

i) activating the transmitter driver and transmitter means to transmit an earthbound electromagnetic field pulse effective for airborne geological surveying in an "ON" interval;

ii) processing the earth response to the electromagnetic field response in an "OFF" interval;

iii) amplifying the earth response by activating the non-linear gain amplifier; and

iv) collecting the amplified earth response signal data and processing said signal data to derive geophysical survey data.